PLANNING & STATISTICS
DEPARTMENT OF FINANCE

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MEASURING AGGREGATE ECONOMIC ACTIVITY

1. Introduction

The Planning and Statistics Division receives many requests for information on national and provincial economic production, and it is the purpose of this issue of Economic Trends to describe various measures of aggregate economic activity and through them to highlight our knowledge of the Prince Edward Island economy.

Statistical systems for measuring aggregate economic activity for the nation are well established in Canada, but advances in this field at the provincial level are of a more recent nature. It is an area which is still under active development. Thus, presently available information for the provinces is less reliable, less timely and less complete than that for the nation.

Hopefully, this paper will assist users of this information understand and interpret available statistics.

2. Measuring National Output

The key statistics on the national economy, which provide guidance for fiscal and economic policy generally, are the quarterly estimates of Gross National Product, issued by the National Accounts Division of Statistics Canada.

All statistics pertaining to G.N.P., including provincial estimates, have a common source in the System of National Accounts, and thus they are all compatible with each other, within the limits of data availability.

The quarterly G.N.P. figures are published with a delay of approximately three months from the end of the quarter to which they refer. Slightly more recent information on the economy in aggregate is available in the monthly figures on Gross Domestic Product by Industry in Constant Dollars, published with a delay of about two months from the current month. In

addition, Statistics Canada has recently extended its publications on the national economy with a report "Current Economic Analysis", which contains a new statistic called the Canadian Composite Leading Indicator. This publication provides an up-to-date analysis of the general economic situation on a monthly basis.

To the general reader, the variety of terms used to describe the state of the economy can be disconcerting. Very briefly the measures used are:

Gross National Product at Market Prices (G.N.P.), which has the same value as,

Gross National Expenditure (G.N.E.), but which is conceptually somewhat different from,

Gross Domestic Product at Factor Cost (G.D.P.).

The composition of these three measures for Canada in 1980 is displayed in Table 1. As can be seen, G.N.P. valued $291,869 million in 1980, and it is composed of various sources of income such as wages, salaries and net farm income. G.N.E. is measured by adding up items of final expenditure, particularly personal expenditures on consumer goods and services, government expenditures, capital formation and exports less imports. These items of expenditure are converted into 1971 constant dollar equivalents by dividing by their price changes to derive G.N.E. in Constant Dollars. Further, the quarterly estimates are adjusted for seasonality and converted into annual equivalents, and thus we have G.N.E. in Constant Dollars, seasonally adjusted at annual rates (G.N.E., 1971 $, SAAR). It is the percentage changes in this figure that are generally accepted as indicating growth or decline of the national economy, often referred to as changes in Constant Dollar G.N.P., or Real G.N.P.

National output can be measured from the income side (G.N.P.) and the expenditure side (G.N.E.). A third way is to sum up each industry's contribution to production. To do this and avoid doublecounting the gross value of products which are traded between companies, the value of intermediate purchases are eliminated. Thus one utilizes the value added concept to derive Gross Domestic Product at Factor Cost, by industry. However, this methodology is very time consuming and consequently not used in the quarterly estimates. The figure $270,942 million, shown in Table 1, is derived from the G.N.P. figure. Full industry detail is available only in the annual publications, presently up to 1980, also shown in Table 1.

Table 1

GROSS NATIONAL PRODUCT, GROSS NATIONAL EXPENDITURES AND GROSS DOMESTIC PRODUCT, CANADA.

1980, $ MILLIONS

Gross National Product	
Wages, Salaries & Suppl. Labour Income	$163,786
Military Pay & Allowances	1,669
Corporation Profits before taxes	36,456
Dividends paid to non-residents	-3,117
Interest & Misc. Investment Income	22,164
Accrued Net Farm Income	4,005
Net Income of Unincorp. Business	11,669
Inventory Valuation Adj.	-7,096
Net National Income at Factor Cost	$229,536
Indirect Taxes less Subsidies	29,012
Capital Consumption Allowances	33,448
Residual Error	-127
Gross National Product at Market Prices	$291,869

Gross National Expenditures	
Personal Expenditures on Consumer Goods & Services	$168,395
Government Current Expend.	58,538
Gross Fixed Capital Formation by Government	8,277
by Business	60,628
Value of Physical Change of Inventory	-1,754
Export of Goods and Services	90,944
Imports of Goods and Services	-93,287
Residual Error	128
Gross National Expenditure at Market Prices	$291,869

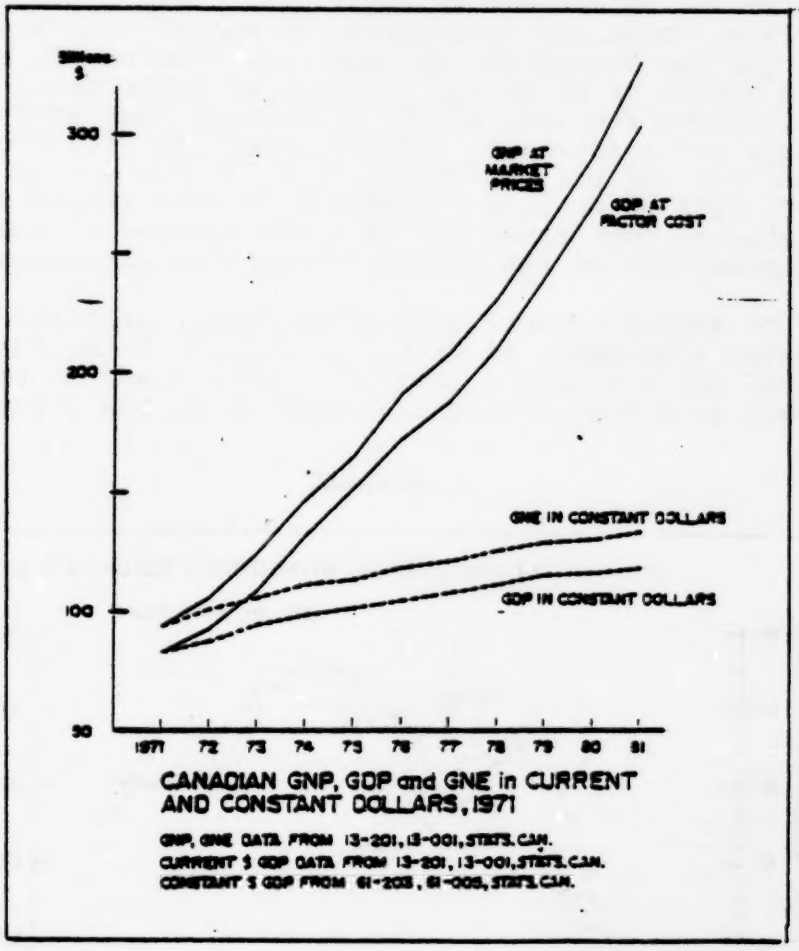
Gross Domestic Product by Industry	
GNP	$291,869
Residual Error	-127
Indirect Taxes & Subsidies	-29,012
Net Investment Income of Non-Residents	7,958
Gross Domestic Product at Factor Cost	$270,942
By Industry	
Agriculture	$ 8,935
Forestry	2,292
Fishing & Trapping	623
Mines, Quarries, Oil Wells	17,459
Manufacturing	57,852
Construction	15,687
Transportation	14,571
Storage	660
Communications	7,504
Utilities	9,472
Wholesale Trade	12,620
Retail Trade	16,848
Finance, Insurance & Real Estate	28,397
Public Admin & Defence	20,101
Community, Business & Personal Services	55,401
Total GDP	$268,422

NOTE: Industry Detail does not include latest revision.

Source: Statistics Canada, 13-001, First Quarter 1982.

By contrast, Statistics Canada does make estimates of G.D.P. at Factor Cost, by Industry in Constant Dollars, independently from the G.N.P. exercise, on a monthly basis. Interestingly, these statistics are available in current dollars to 1979, and they differ slightly from the G.D.P. at Factor Cost estimates produced separately in the National Accounts. The basic measures available on a quarterly basis therefore are G.N.P., G.N.E., and G.D.P. in current dollars, and G.N.E. and G.D.P. in constant dollars, and these series are displayed in Diagram 1. The difference between the current dollar and constant dollar figures represents price inflation for the economy in total.

Diagram 1



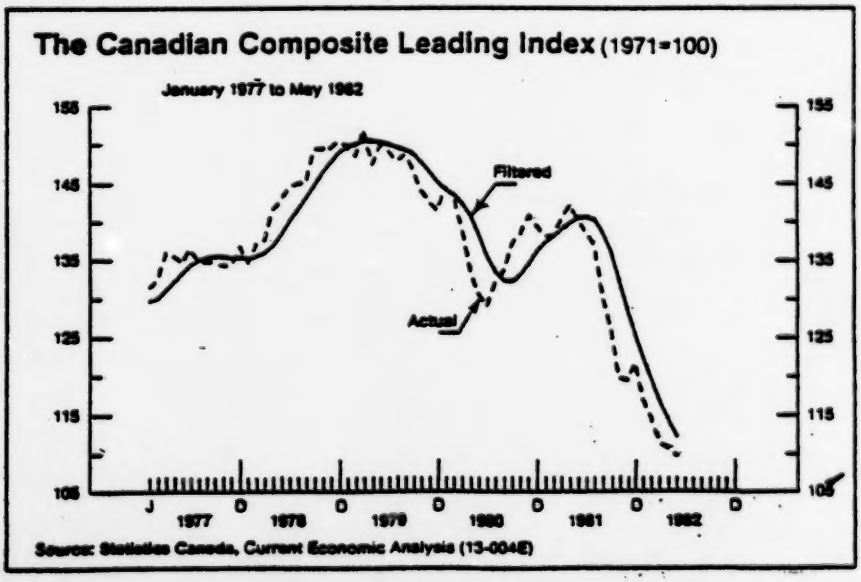
CANADIAN GNP, GDP and GNE in CURRENT AND CONSTANT DOLLARS, 1971

GNP, GNE DATA FROM 13-201, 13-001, STATS. CAN.
CURRENT $ GDP DATA FROM 13-201, 13-001, STATS. CAN.
CONSTANT $ GDP FROM 61-203, 61-005, STATS. CAN.

The terms "Domestic", "National", "Market Prices", "Factor Cost", "Gross" and "Net" signify different methods of measuring national output. One can see from Table 1 that Gross Domestic Product at Factor Cost was smaller than G.N.P. at Market Prices. Essentially, G.D.P. refers to the sum of value added by establishments of an area (country or province). The "domestic" product differs conceptually from the "national" product in that the latter is based on the income or earnings of the residents of an area, while the former is based on the location of the productive units. Investment income of residents of an area from investments outside the area must be added to G.D.P., while investment income paid to non-residents must be subtracted from it, to move to G.N.P. The combined net amount valued $7,958 million in 1980 for Canada. Measuring at Factor Costs means that products are priced according to the cost of the factors of production, including profits. From this figure subsidies must be subtracted and any indirect taxes added to discover the value at Market Prices. We might note that Statistics Canada measures provincial output as G.D.P. at Market Prices. Statistics are also produced on the net value of production and Net National Income at Factor Cost valued $229.5 billion in 1980 (Table 1). The difference between gross or net stems from including or excluding capital consumption allowances in the estimate.

The Canadian Composite Leading Index attempts to provide advance notice of changes in G.N.P. by studying a variety of statistics on the economy. Diagram 2 displays the Index to May of this year, and it is from this source that many forecasters

Diagram 2



are drawing the conclusion that the decline in Canadian real G.N.P. will likely be shown to be continuing in the second quarter of 1982. The data that go into the Index are listed in Table 2.

Table 2

THE CANADIAN COMPOSITE LEADING INDICATOR

1. Average Workweek--Manufacturing (Hours).
2. Residential Construction Index.
3. United States Composite Leading Index.
4. Money Supply (MI).
5. New Orders--Durable Products Industries.
6. Retail Trade--Furniture and Appliances.
7. New Motor Vehicle Sales.
8. Shipment to Inventory Ratio (Finished Goods) --Manufacuring.
9. Stock Price Index (TSE 300 Excluding Oil and Gas, 1975=1000).
10. Percentage Change in Price per Unit Labour Costs--Manufacturing.

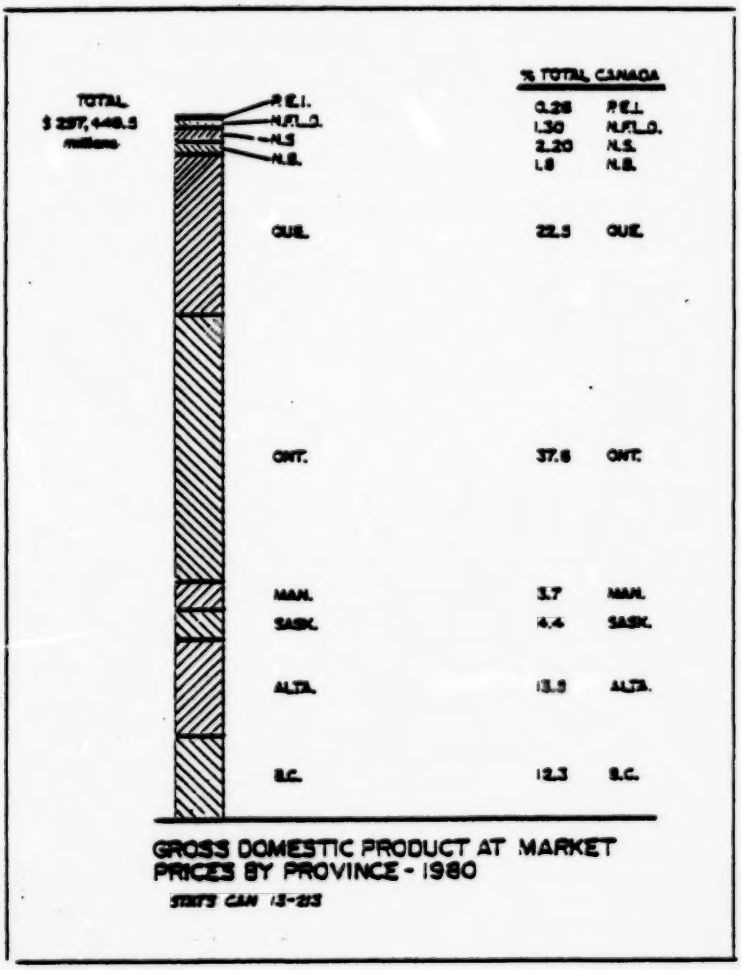
Source: Statistics Canada, 13-004, Current Economic Analysis.

3. Measures of Provincial Aggregate Output

While there are no "official" estimates of gross provincial production, Statistics Canada does produce an estimate of Gross Domestic Product at Market Prices for each province on an experimental basis in their publication "Provincial Economic Accounts". This publication is available with a two-year delay, and the statistics are only provided in current dollars. Thus these statistics are of limited use in evaluating economic performance on an up-to-date basis. Nevertheless, they provide a critical link to the National Accounts and are valuable for longer term analyses.

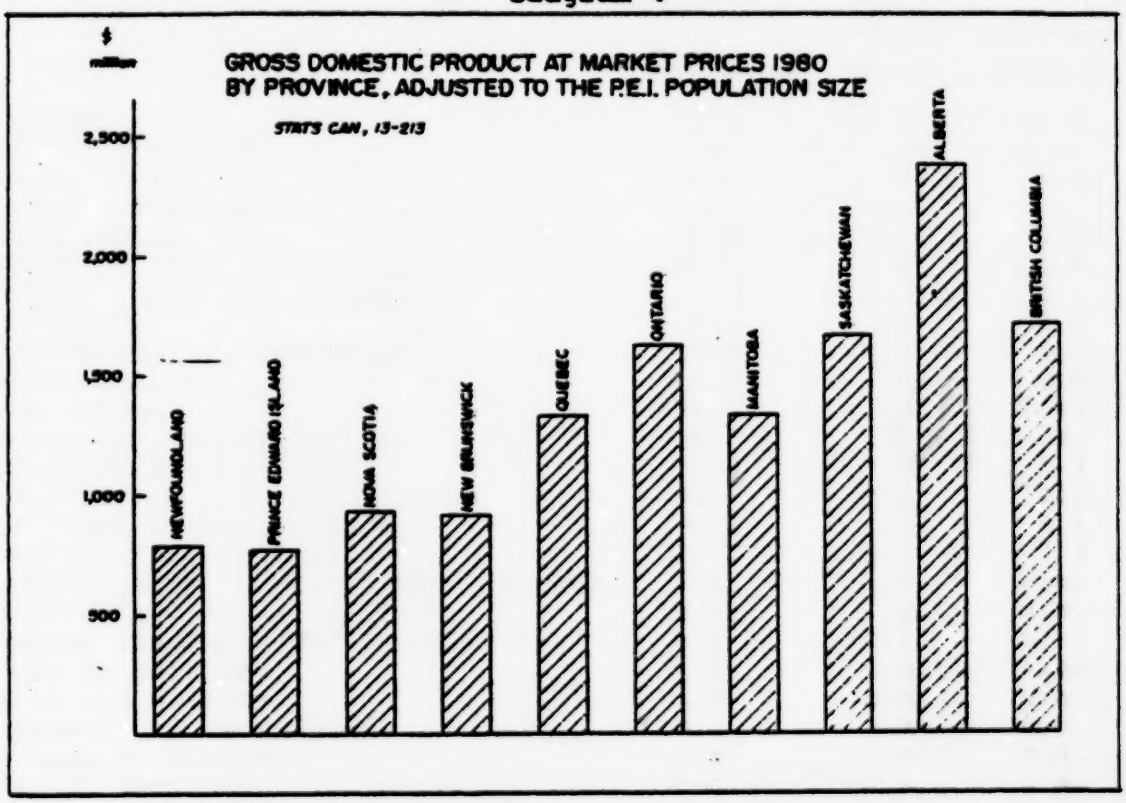
These figures permit one to understand the contribution of each province to national output, and this disaggregation is portrayed in Diagram 3. Prince Edward Island, with 0.5% of the Canadian population, provided 0.26% of total G.D.P. in 1980. The whole Atlantic Region contributed to only 5.6% of national output. By contrast, Ontario and Quebec combined produce approximately 60% of total Canadian G.D.P. Alberta moved up from 8.9% of total G.D.P. in 1971, to 13.5% in 1980 by posting consistent above average rates of growth.

Diagram 3



The output performance of P.E.I. relative to other provinces, taking into account its small population, can be judged in Diagram 4. G.D.P. per capita for P.E.I. measured 51% of the national average, which was the lowest of any province. The significant disparity between Alberta, British Columbia, Ontario, Saskatchewan and the Atlantic Provinces is very apparent in this Diagram. These figures indicate that the value of production per person on Prince Edward Island must approximately double to put Islanders on equal footing with Ontarians, in terms of earning ability. It might be noted that a move of this magnitude would drastically reduce transfer dependence.

Diagram 4



New statistics are being developed by Statistics Canada on provincial output by industry. Some have been released and these are tabulated in Table 3, which also indicates those sectors for which statistics remain unavailable. The statistics are published at the present only to the year 1979 and they show G.D.P. at Factor Cost (value added) by industry, in current and, in some cases, constant dollars. The available statistics cover approximately 34% of G.D.P. for Prince Edward Island.

Table 3

GROSS DOMESTIC PRODUCT AT FACTOR COST BY INDUSTRY,

P.E.I., 1979, $ MILLIONS

	Current $	% of Total	Constant 1971 $
Agriculture	67.6	9.2	31.3
Forestry	x	x	n.a.
Fishing	21.8	3.0	8.4
Hunting and Trapping	x	x	x
Manufacturing	66.8	9.1	30.0
of which Food & Beverage,	51.5	7.0	22.4
Printing and Publishing,	3.7	0.5	2.1
Machinery,	1.7	0.2	0.8
Transportation Equipment,	1.5	0.2	0.7
Miscellaneous,	0.5	0.1	0.4
Construction	54.1	7.4	n.a.
Electricity, Water and Gas	14.2	1.9	n.a.
of which Electricity	12.9	1.8	5.9
Accommodation and Food Service	25.7	3.5	12.4
of which Hotels, Motels,	8.3	1.1	4.1
Restaurants and Bars	16.0	2.2	7.4
Transportation, Communication, Storage	n.a.	n.a.	n.a.
Wholesale and Retail Trade	n.a.	n.a.	n.a.
Finance, Insurance and Real Estate	n.a.	n.a.	n.a.
Education Services	n.a.	n.a.	n.a.
Health and Welfare	n.a.	n.a.	n.a.
Amusement and Recreation	n.a.	n.a.	n.a.
Services to Business	n.a.	n.a.	n.a.
Personal Services	n.a.	n.a.	n.a.
Public Administration and Defence	n.a.	n.a.	n.a.
Total for Available Industries	250.2	34.1	--
Total GDP, Factor Cost	733.9	100.0	

Source: Statistics Canada 61-202
"x" Confidential, "n.a." Not Available

One can see that when moving from national level statistics to the provincial one confronts a significant reduction in quality, coverage and timeliness of the data available from Statistics Canada. The Conference Board of Canada attempts to fill these gaps through its program of providing reviews of current economic conditions by province. It produces estimates of G.D.P. at Factor Cost by province and by industry, both in current and constant dollars, together with statistics on various major economic indicators such as the unemployment rate, retail sales, housing starts and personal income. These output figures are consistent with the historical provincial data of Statistics Canada, and are compatible with national level statistics on G.D.P. and G.N.P. However, the numbers are subject to significant revision from one quarter to the next. Not only are current and future year estimates subject to revision as new data becomes available but so are previous years' data. Compounding this problem, the Statistics Canada figures themselves are subject to significant change, and consequently it is not unknown to find a forecast of strong growth change to decline, and end up as modest growth. The final statistic may have been subject to twelve internal revisions and three to four revisions by Statistics Canada by which time it is three or four years out of date.

Unfortunately, small percentage changes in a time series can produce major changes in rates of growth, and it may not be realized that the Conference Board material at the provincial level for the current and future years and past years is subject to these significant revisions. Nevertheless these statistics are useful if caution is exercised. Their forecasts of growth of G.D.P. in Constant Dollars, sometimes known as Real Domestic Product (R.D.P.), are widely reported in the media, although subsequent revisions tend to be less newsworthy.

4. Aggregate Economic Activity on P.E.I.

Prince Edward Island's Gross Domestic Product at Market Prices is estimated to have been $786.8 million in 1980 according to Statistics Canada. Details of this estimate, together with Personal Income, Net Provincial Income and Gross Domestic Product at Factor Cost are shown in Table 4. It is unusual to find Personal Income and G.D.P. at Factor Cost to have valued more than G.D.P. at Market Prices and

this is the result of significant transfers to persons and subsidies to industry (including the oil import subsidy) on P.E.I.

Table 4

GROSS DOMESTIC PRODUCT, PERSONAL INCOME,

P.E.I., 1980, $ MILLIONS

Wages, Salaries and Supplementary Labour Income	$460.0
Military Pay and Allowances	21.0
Net Income of Farm Operators from Farming	63.0
Net Income of Non-farm Unincorporated Business Income	57.0
Interest, Dividends and Miscellaneous Investment Income	73.0
Transfers to Persons	200.0
Total Personal Income	$874.0
Less Transfers to Persons	-200.0
Add Profits (Losses) of Government Enterprises	-46.7
Add Corporate Profits Before Taxes	+82.0
Inventory Valuation Adjustment	-14.2
Net Provincial Income at Factor Cost	695.1
Add Capital Consumption Allowances	+102.9
Gross Domestic Product at Factor Cost	798.0
Add Indirect Taxes	+85.3
Less Subsidies	-96.5
Gross Domestic Product at Market Prices	$786.8

Source: Provincial Economic Accounts, Statistics Canada 13-213, Experimental.

The Provincial Economic Accounts also provide a partial breakdown of Gross Provincial Expenditure and this is displayed in Table 5. Included in this Table are statistics on the disposition of personal income. Missing from a full tabulation of Gross Provincial Expenditures is the value of exports off the Island, and consequently the value of "Exports Less Imports" is derived by deduction from the equality of total G.D.P. and G.P.E. It valued -$434.9 million in 1980, which is indicative of the discrepancy between the value of production on Prince Edward Island relative to the size of Island expenditures.

Table 5

GROSS PROVINCIAL EXPENDITURES,

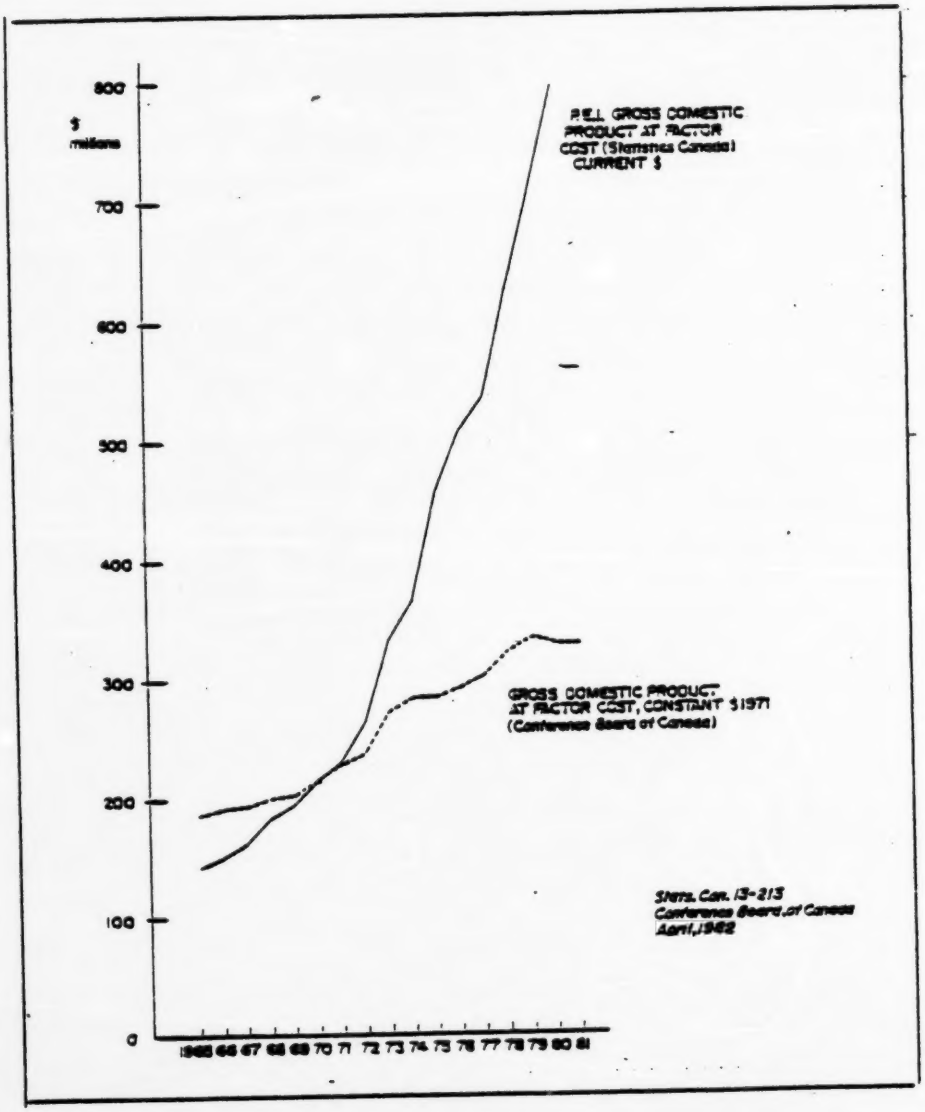
P.E.I., 1980, $ MILLIONS

Total Personal Income	$874.0
Less Direct Taxes	-129.0
Personal Disposable Income	$745.0
Less Personal Savings	-44.0
Less Transfers to Corporations and Others	-22.0
Personal Expenditures on Consumer Goods and Services	682.0
Government Current Expenditures	346.4
Government Capital Expenditures	61.3
Business Capital Formation	121.7
Value of Physical Change in Inventories	10.6
Exports Less Imports (and Errors)	-434.9
Gross Provincial Expenditure at Market Prices	$786.8

Source: Provincial Economic Accounts, Statistics Canada, 13-213, Experimental

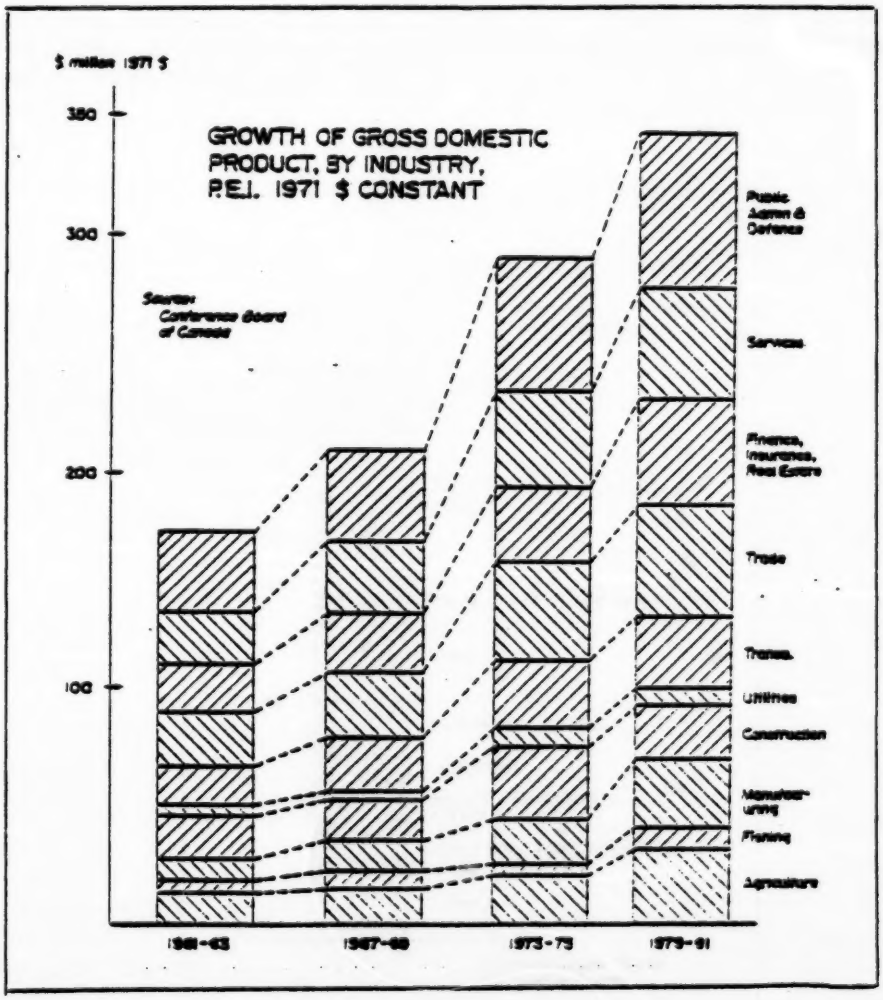
Current and constant dollar figures on G.D.P. at Factor Cost for Prince Edward Island are displayed in Diagram 5, and they provide an indication of the effect of inflation on these measures. One can see that economic growth on P.E.I. quickened in the early '70's and sustained growth weakened moving into the '80's. Present forecasts from the Conference Board point to a distinct decline in economic activity in many provinces over the past three years, not only in Prince Edward Island but also in Ontario, Quebec and Newfoundland.

Diagram 5



The contribution of various industrial sectors to changes in the constant dollar G.D.P. estimates of the Conference Board of Canada can be seen in Diagram 6. The growth of the early '70's appears to stem largely from expansion of the public administration, services, trade and construction sectors. The late '70's witnessed a sizeable increase in agriculture, fishing and manufacturing, but a large slowdown in construction occurred, slowing growth generally. Moving into 1982, present indications point to significant declines in many industries.

Diagram 6

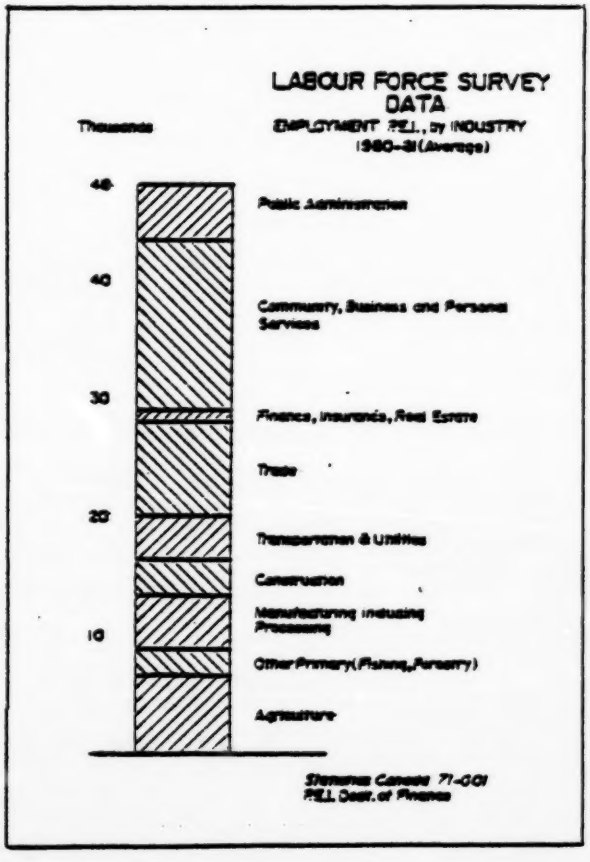


5. Conclusions

Measures of aggregate economic activity are probably the most sought-after statistics on the economy. This paper hopefully sheds some light on how these figures are estimated and on their availability and reliability, particularly at the provincial level.

Naturally, the nature of the economy determines many things in a Province, including standards of living, employment opportunities, urban/rural settlement patterns and so on. In Diagram 7, one can see the distribution of employment on Prince Edward Island, which follows closely the distribution of G.D.P. by industry. The slowdown in economic activity in recent years has had a significant impact on employment levels, and coupled with the surge in numbers leaving schools and colleges the rate of unemployment among young adults has reached a very high level.

Diagram 7



The longer term issue for Prince Edward Island, and Atlantic Canada generally, is one of raising G.D.P. per capita and thereby reducing income disparities and transfer dependence relative to the rest of Canada. The continuing dilemma for Prince Edward Island is how to attract investment capital in sufficient amounts so that improved productivity raises employment opportunities rather than the reverse. The history of rural depopulation on Prince Edward Island is evidence of the social consequences of a massive movement to increased G.D.P. per worker which can occur without compensating developments in other sectors.

Statistical improvements at the provincial level have been considerable in recent years and in time we will hopefully have access to data approaching the national level. Measures of aggregate economic activity are becoming an indispensable input into decision making by a wide variety of data users. We look forward to continuing refinement of these measures.

August 27, 1982